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CERTIFICATE

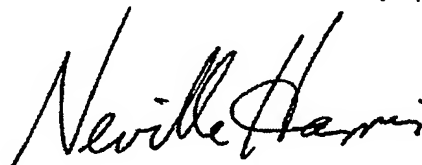
This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 24 July 2002 with an application for Letters Patent number 520365 made by DISTECH LIMITED.

Dated 7 August 2003.

PRIORITY DOCUMENT

SUBMITTED OR TRANSMITTED IN
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Neville Harris
Commissioner of Patents



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520365

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24 JUL 2002

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Patents Form No. 4

Our Ref: MH503890

Patents Act 1953

PROVISIONAL SPECIFICATION

VACUUM SEALING ARRANGEMENT FOR A LIQUID CONCENTRATOR

We, **DISTECH LIMITED**, a New Zealand company, of 62 Lunn Avenue, Mt Wellington, Auckland 5, New Zealand do hereby declare this invention to be described in the following statement:

PT0460987

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Vacuum Sealing Arrangement For A Liquid Concentrator

Background of the Invention

5 The present invention relates to improvements in and relating to a vacuum sealing arrangement for a liquid concentrator.

 Liquid concentrators are used in numerous types of industries. In New Zealand a major use is in respect of the concentration of milk so as to achieve a more
10 cost effective transportation of the milk.

 It is to be understood, however, that the present invention has application throughout the area of liquid concentrators no matter what their intended use may be.

15 A significant problem with existing liquid concentrators is in respect of the maintaining of the vacuum within the various concentrator componentry. Typically this problem presents itself at the seals required for the external ducting between the various concentrator components. In liquid concentrators, by evaporating the liquid
20 in a partial vacuum, concentration can be effected at lower than normal temperatures thus reducing damage to the liquid and where and possible damage to the materials used in the construction of the concentrator. By utilizing methods of vapour recompression, the latent heat of condensation can be used to create the evaporation process and provides substantial energy savings. In concentrators operating under
25 partial vacuum, extensive engineering is required to ensure the structural strength and vacuum. In one example of a typical concentrator used in concentration of milk the concentrator would be operating at temperatures of the order of 75°C and at .3 bar partial vacuum.

30 There is therefore in current concentrators the cost and complexity of maintaining the vacuum seals between the various concentrated components.

Although the present invention has particular use in liquid concentrators, it will be apparent to those skilled in the engineering arts that the present invention may have applications throughout the design of any other apparatus which incorporates a plurality of interconnected components all or some of which are required to operate under a vacuum. The term "concentrator" as used in the present specification is therefore to be understood to cover all such apparatus.

Objects of the Invention

It is thus an object of the present invention in one embodiment thereof to provide a liquid concentrator which overcomes or at least ameliorates problems with such liquid concentrators available to the present time and/or which at least will provide the public with a useful choice.

Further objects of this invention may become apparent from the description.

Summary of the Invention

According to one aspect of the present invention there is provided a liquid concentrator having a plurality of components required to operate in use under vacuum and wherein said components are adapted to be provided within a common enclosing means and within which a required vacuum is in use may be established.

According to a further aspect of the present invention the method of constructing a liquid concentrator having a plurality of inter-connected components each required to operate under a vacuum, includes providing said components with a common enclosing means and adapting said enclosing means to have a required vacuum established therein.

According to a still further aspect of the present invention a liquid concentrator and/or a method of constructing a liquid concentrator is/are substantially as herein described with reference to the accompanying drawing.

According to a still further aspect of the present invention, an apparatus (other than a liquid concentrator) is constructed according to any of the three immediately preceding paragraphs.

Further aspects of this invention which shall be considered in all its novel aspects will become apparent from the following description given by way of example of possible embodiments thereof and in reference is made to the accompanying drawings.

Brief Description of the Drawings

Figure 1: Shows very diagrammatically a liquid concentrator according to one possible embodiment of the invention.

Brief Description of the Preferred Embodiment of the Invention

As mentioned previously a liquid concentrator is an example of an apparatus which has a plurality of inter-connected components each of which is required to operate under a vacuum.

In Figure 1 a very diagrammatic cross-sectional view of a concentrator is shown in which the various components of the concentrator are arranged within a common enclosure 1 and within which a required vacuum will in use be established and maintained. The enclosure 1, which may be any suitable vacuum vessel or chamber, will be provided with appropriate vacuum establishing means of any suitable type and as will be well known to those skilled in the engineering arts.

In the particular embodiment shown a liquid to be concentrated is fed into a feed section 2 and then into an evaporation/condensing section 3.

Typically the liquid will be boiled at a reduced temperature within the evaporation/condensing section 3 in producing concentrated liquid and steam. The

mixture of the concentrated liquid and steam will then pass through a separation area 4 and a baffle arrangement 5 where the concentrated liquid is separated from the vapour.

5 The vapour may then pass through a vapour compressor 6 driven by a motor 7. A seal 8 is suitably provided for the shaft of the compressor 6 in retaining the vacuum within the vessel 1.

10 Compressed steam may then suitably be fed through a return duct 9 to the evaporation/condensing section 3 where the latent heat of the steam will be given off to boil the incoming liquid. This action will result in the condensation of the steam to pure water which can be extracted through the vessel through a pipe connection 10. Any non-condensable gasses may be recycled through connection 11 for subsequent discharge through the system that provides the vacuum to the vessel 1.

15 It will be seen that by arranging all the major components of the concentrator fully within a common closure such as a vacuum vessel 1, the design requirements for vacuum, strength and integrity for those components is minimised to be only those of the vessel 1 and the connections.

20 As mentioned previously, although this invention has been described particularly with respect to the various components of a liquid concentrator it will be understood by those skilled in the engineering arts that the present invention could have application in respect of any design of apparatus having multiple components which are required to operate under a vacuum and for which according to the present invention the cost and complexity of providing the vacuum can be reduced by providing the components within a common vacuum enclosure or vessel.

25 Where in the foregoing description, reference has been made to specific components or integers having known equivalents, then such equivalents are incorporated herein as if individually set forth.

Although the above description has been given by way of example with reference to possible embodiments of the invention, it is to be understood that modifications or improvements may be made without departing from the scope of the invention.

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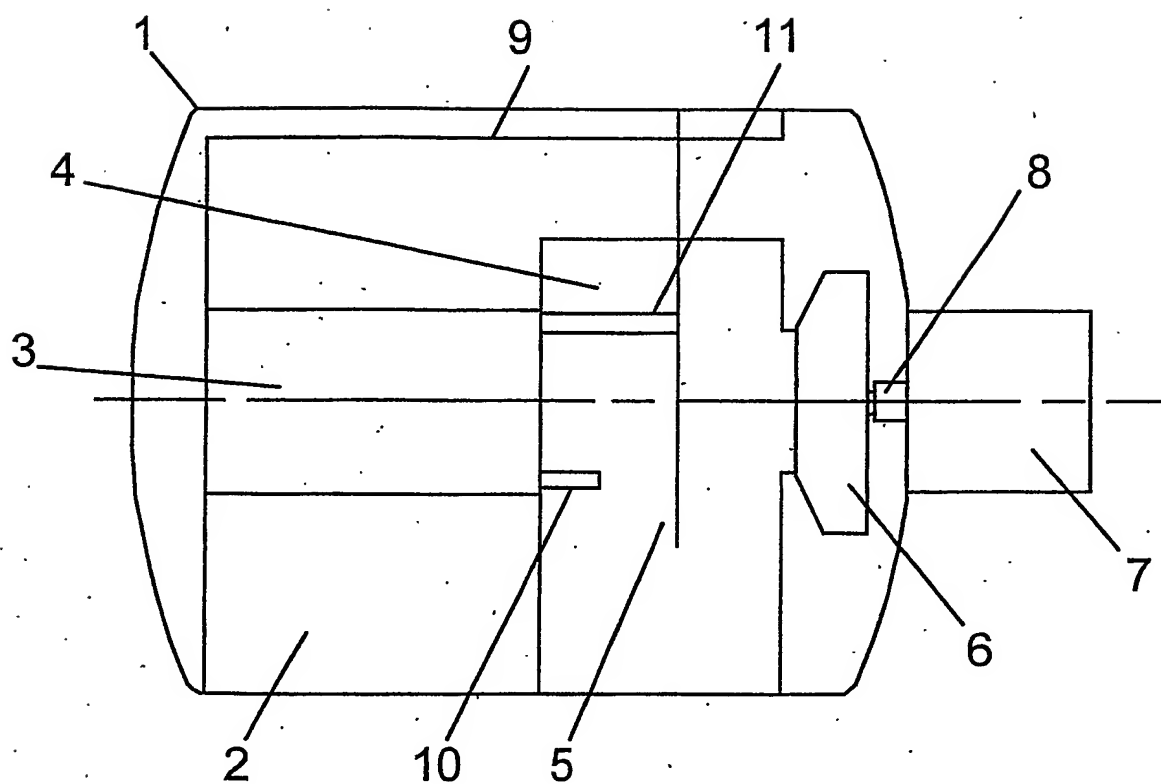


FIGURE 1

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